

64. (amended) The method of claim 61, wherein the NO_x in the exhaust gas is reduced to a level in the range of about 10-200 ppm.

65. (amended) The method of claim 61, wherein NH₃ and HNCO together are in the range of about 0.5-2.0 molar ratio with respect to the NO_x in the exhaust gas.

66. (amended) The method of claim 61, wherein the autocatalytic reactions are self-sustained in the autothermally heated exhaust gas even when a portion of the heat released is recovered by heat transfer surfaces.

67. (amended) The method of claim 61, wherein the heat release is equivalent to a uniform adiabatic increase of about 50-500°F in the exhaust gas temperature.

68. (amended) The method of claim 61, wherein the exhaust gas is heated within about 0.02-1.5 seconds to a final temperature.

69. (amended) The method of claim 61, wherein the CO is oxidized below a residual concentration of about 2000 ppm.

70. (amended) The method of claim 61, wherein the CO is oxidized below a residual concentration of about 500 ppm.

71. (amended) The method of claim 61, wherein the residual concentration of NH₃ is maintained at a level below about 20 ppm.

72. (amended) The method of claim 61, wherein the residual CO concentration is depleted below about 50 ppm and the residual NH₃ is depleted below about 2 ppm.

73. (amended) The method of claim 61, wherein the hydrocarbon(s) are at least one member selected from the group consisting of [comprise material(s) selected from the group consisting of hydrocarbon mixtures such as] natural gas, liquefied petroleum gas, alcohols, gasoline, diesel fuel, aviation turbine fuel, [various] oxygenated hydrocarbons, hydrocarbon amines, [or any fraction of such mixtures, including purified components such as carbon monoxide,] methane, propane, methanol and ethanol, either as liquids or vapors.

74. (amended) The method of claim 61, wherein the hydrocarbon(s) are introduced [substantially] throughout a cross-section or around a perimeter of the exhaust gas flowpath using one or more nozzles[, including a multiplicity thereof].

75. (amended) The method of claim 61, wherein the hydrocarbon(s) are introduced as liquid drops with diameters in the range of about 20-500 microns.

76. (amended) The method of claim ~~61~~¹⁶, wherein the hydrocarbon(s) are introduced in the exhaust gas using a carrier gas selected from the group consisting of [or atomizing gas such as] steam, compressed air, pressurized exhaust gas, or ammonia [gaseous or vaporous hydrocarbon(s) or any gaseous or vaporous NH₃ compositions].

177. (amended) The method of claim ~~61~~¹⁷, further comprising the steps of measuring a final temperature at one or more locations throughout the cross-section of the exhaust gas flowpath and controlling the amount of introduced hydrocarbon(s) to maintain the measured temperature(s) at a level in the range of about 1400-1550°F.

178. (amended) The method of claim [24] ~~77~~¹⁷, further comprising the step of measuring a final CO concentration at one or more locations throughout the cross-section of the exhaust gas flowpath downstream from the temperature measurement(s).

79. (amended) The method of claim [25], ~~78~~ further comprising the step of using the final CO measurement(s) to verify a level of CO depletion corresponding to the final temperature(s) for controlling the introduction of hydrocarbon(s).

80. (amended) The method of claim ~~61~~⁸⁴, further comprising the step of generating NH₃, HNCO or a combination thereof by vaporization, decomposition, or catalytic conversion of at least one reductant(s) [which comprise any of the material(s)] selected from the group consisting of NH₃, HNCO, cyanuric acid or a tautomer of cyanuric acid, urea, [decomposition products of urea, compounds which decompose to produce NH₃ as a byproduct,] ammonium salts of organic acids, and hydrocarbon amines[, or combinations of the foregoing, whether pure compounds or mixtures, as solids, liquid melts, emulsions, slurries or solutions in water, alcohols, hydrocarbons, or oxygenated hydrocarbon solvents].

21. 81. (amended) The method of claim [27] ~~61~~²¹, wherein the NH₃, HNCO or a combination thereof are generated prior to the introduction of hydrocarbon(s).

22. 82. (amended) The method of claim [27] ~~61~~²², wherein the NH₃, HNCO or a combination thereof are generated after the introduction of hydrocarbon(s).

23. 83. (amended) The method of claim [27] ~~61~~²³, wherein the NH₃, HNCO or a combination thereof are generated concurrently with the hydrocarbon(s).

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84. (amended) The method of claim [27] ~~61~~²⁴, further comprising the step of injecting reductant(s) directly [to vaporize or decompose in the exhaust gas] into the exhaust gas to vaporize or decompose the reductant(s).

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85. (amended) The method of claim [31] ~~84~~²⁴, wherein the reductant(s) are injected prior to the introduction of hydrocarbon(s).

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86. (amended) The method of claim [31] ~~84~~²⁴, wherein the reductant(s) are injected after the introduction of hydrocarbon(s).

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87. (amended) The method of claim [31] ~~84~~²⁴, wherein the reductant(s) are injected concurrently with the introduced hydrocarbon(s) as mixtures, solutions, emulsions, slurries, or atomized [atomizing] gases [, atomized liquids or combined chemical structures].

88. (amended) The method of claim [31] ~~84~~²⁴, wherein the reductant(s) comprise a concentrated aqueous solution consisting of NH_3 , urea or combinations thereof in water containing dissolved nitrogen in the range of about 15-30% by weight.

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89. (amended) The method of claim [31] ~~84~~²⁴, further comprising the steps of measuring baseline NOx levels in the exhaust gas with respect to an operating condition of combustion equipment that produces the exhaust gas and controlling the amount of reductant(s) injected to maintain a level of NOx reduction or a final NOx level in the exhaust gas throughout the operating range of the combustion equipment.

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90. (amended) The method of claim [36] ~~89~~²⁹, further comprising the step of monitoring an operating condition of the combustion equipment to provide a basis for estimating the baseline NOx emissions throughout the operating range of the combustion equipment, either continuously or [frequently] periodically.

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91. (amended) The method of claim [37] ~~90~~³⁰, wherein the amount of injected reductant(s) is controlled to generate NH_3 and HNCO together at a level in the range of about 0.5-2.0 molar ratio with respect to the baseline NOx [depending on a measurement of the operating condition for the combustion equipment].

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92. (amended) The method of claim [31] ~~84~~³⁰, further comprising the step of measuring a final NOx level at one or more locations throughout the cross-section of the exhaust gas flowpath downstream from the autothermal heating and using [any] temperature measurement(s) [used] to control the introduction of hydrocarbon(s).

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93. (amended) The method of claim [39] 92, further comprising the step of using the final NOx level(s) to verify the effectiveness of selective NOx reduction corresponding to an amount of introduced NH₃ and HNCO or an amount of reductant(s) injected to generate NH₃, HNCO or a combination thereof.

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94. (amended) The method of claim [40] 93, further comprising the step of controlling the amount of introduced NH₃, [and] HNCO or the amount of reductant(s) injected to maintain a final NOx level in the exhaust gas.

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95. (amended) The method of claim 61, further comprising [either alternative] the step of [preheating or precooling] adjusting the temperature of the exhaust gas to a temperature in the range of about 900-1600°F before the introduction of hydrocarbon(s).

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96. (amended) The method of claim [42] 95, wherein the temperature of the exhaust gas is [preheated or precooled] adjusted to a temperature in the range of about 1050-1600°F so that the exhaust gas is heated autothermally in 0.02-1.0 seconds to a final temperature in the range of about 1400-1550°F by a heat release equivalent to an adiabatic increase of about 50-350°F effective for enhancing the selectivity of autocatalytic NOx reduction.

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97. (amended) The method of claim [42] 95, wherein the temperature of the exhaust gas is [preheated or precooled] adjusted to a temperature in the range of about 1200-1600°F so that the exhaust gas is heated autothermally in 0.02-0.5 seconds to a final temperature in the range of about 1400-1550°F by a heat release equivalent to an adiabatic increase of about 50-200°F effective for enhancing the selectivity of autocatalytic NOx reduction.

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98. (amended) The method of claim 61, further comprising the step of combusting a [supplemental] fuel to preheat the exhaust gas in the temperature range of about 900-1350°F.

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99. (amended) The method of claim [45] 98, wherein [a supplemental] the fuel is combusted directly in the exhaust gas.

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100. (amended) The method of claim 61, wherein the introduced hydrocarbon(s) are mixed substantially uniformly [before the] and the autothermal heating results in an appearance of a visible chemiluminescence.

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101. (amended) The method of claim 61, further comprising the step of recovering heat from the autothermally heated exhaust gas using heat transfer surfaces between the exhaust gas and the heat recovery fluid.

106. (amended) The method of claim 61, [further comprising the step of generating NH_3 breakthrough from a previous noncatalytic method for selectively reducing NO_x , the method further comprising the noncatalytic reduction of NO_x at temperatures above 1600°F prior to the autothermal exhaust gas heating and autocatalytic NO_x reduction] wherein the exhaust gas is generated by a previous noncatalytic method for selectively reducing NO_x .

107. (amended) The method of claim 61, further comprising the step of catalytically reducing a portion of [the] any remaining NO_x [using a solid catalytic surface and additional generation of NH_3 , HNCO , or combinations thereof] after the autothermal exhaust gas heating and autocatalytic NO_x reduction.

108. (amended) The method of claim [54] 107, wherein the exhaust gas is heated autothermally to control the temperature for the [subsequent] catalytic NO_x reduction [using a solid catalytic surface].

109. (amended) The method of claim [54] 107, wherein the [first stage of gas-phase] autocatalytic NO_x reduction lowers the inlet NO_x level prior to the [solid] catalytic [surface] NO_x reduction.

110. (amended) The method of claim [54] 107, wherein the [first stage of] autothermal heating decreases exhaust gas contaminants comprising such as hydrocarbons, soot, CO or and particulate matter.

Please delete claims 102-105 and 111 without prejudice.

REMARKS

Claims 61-110 were in the application was in the application (claims 102-105 and 111 have been deleted without prejudice in this amendment). The amendments and deletions herein are an effort to make parallel changes to the claims made in parent application, Ser. No. 08/742,769, as has been discussed with the Examiner. Applicant also has corrected various informal matters, such as incorrect dependencies, in this amendment.

It is submitted that the claims in the present application are allowable over the cited art as previously discussed in the parent application.

Applicant's attorney wishes to thank the Examiner for the careful review of the claims in the parent application and for the courtesies extended during the recent telephone interview